ADOT CORRIDOR PROFILE STUDIES

Round 3 (I-10 West and SR 85; I-10 East; SR 87/SR 260/SR 377; US 60/US 70/US 191; and US 93/US 60)

Technical Advisory Committee (TAC)
Meeting Summary No. 8

December 1, 2016

Attendees: *phoned-in

Tyler Besch	AECOM	Dee Crumbacher*	ADOT
Michael Grandy	Kimley-Horn	Maria Deal*	ADOT
Jennifer Love	WSP/PB	Tazeen Dewan	ADOT
Larry Doescher	ADOT	Joy Melita	WSP/PB
Asad Karim	ADOT	Brian Miller	FHWA
Margaret Ittelson	HDR	Romare Truly	FHWA
Mark Hoffman	ADOT	Tom Deitering	FHWA
Kimberly Bodington	AECOM	Dillon Kennedy	ADOT
Kerry Wilcoxon	ADOT-TSS	Jason James*	NACOG
Brian Snider	Wilson & Co.	Sam Sanford*	PAG
Amy Moran	Wilson & Co.	Micah Horowitz*	ASLD
Michael LaBianca	HDR	Raul Amavisca	ADOT
Eric Sweat	Kimley-Horn	Bill Harmon*	ADOT
Pedram Shafieian*	ADOT	Isabell Garcia*	ADOT
Randy Blake	ADOT	Jason Hafner*	SCMPO
Kara Lavertue*	ADOT	James Gomes*	ADOT
Heidi Yaqub	ADOT	Tom Engel*	ADOT
Paul Patane*	ADOT	Brent Crowther*	Kimley-Horn

Introductions

Tyler Besch (AECOM) welcomed the attendees and initiated introductions. The meeting sign-in sheet is attached. Tyler reminded the group to respond with comments on Round 3 Draft Working Paper 6 by December 9, 2016.

I. Overview of the Corridor Profile Studies

An overview of the Corridor Study Process was provided, including the status of the statewide program and Rounds 2 and 3 corridors specifically.

II. Review of Round 3, *Tasks 6 & 7 Solution Evaluation and Prioritization*

Tyler Besch reviewed the methodology used to evaluate and prioritize the strategic solutions, including Life Cycle Cost Analysis (LCCA), Performance Effectiveness, and Risk Factors. Each of the Round 3 teams then presented the results of the Draft Working Paper 6 – *Solution Evaluation and Prioritization*. Questions and discussion are summarized below:

- Tom Engel (SE District): Clarified that CS 10E.18 covered the vicinity within the area of I-10.
- Maria (Traffic): Noted typo in Pavement LCCA table for CS70.3 where "US 60" should read "US 70" in solution title

- Raul Amavisca followed up with Amy Moran regarding ADOT standards on the placement of flashing beacons warning of a signalized intersection ahead. Amy indicated she was not aware of an ADOT standard for flashing beacon placement but that flashing beacons have been shown to reduce crashes approaching intersections. Raul suggested the team reach out to Tony Abbo, ADOT Regional Traffic Engineer, to confirm there are no ADOT standards for flashing beacon placement.
- CS 87.6: Raul Amavisca asked if rockfall mitigation was part of the recommended solution. Michael from Kimley-Horn indicated the solution did not include rockfall mitigation but rather was focused on warning signs in the vicinity of intersections.

III. Next Steps

Tyler Besch reviewed the next steps for each round, as shown below:

- **Round 2**: Draft Final Report on ADOT Website will be finalized in early 2017
- **Round 3**: Submit Draft Final Report for TAC review in late 2016 or early 2017
- **Round 1**: Draft Final Report on ADOT Website will be finalized in early 2017
- Statewide Summary Report and a guidebook identifying the steps and methods used to do this analysis will be produced after the completion of the Final Reports for all three rounds

Round 3 Corridor Profile Studies
TAC Meeting #8
Meeting Attendance Sign-in

Date: December 1, 2016 Time 2:00 PM Location: ADOT Arizona Room

Name	Organization	Telephone	Address	Email
TYLER BESCH	AECOM	602.648.2331	———	tyler.besch@aecom.com
Michael Grandy	Kimley-Horn	4802072666		michael.grandy@kimley-horn.com
JENNIFER LOVE	PB	480-966-8397		LOVE@PBworld.com
Larry W. Doescher	ADOT-PMG	602.712.7551	205 S. 17th Ave, MD# 617E	ldoescher@azdot.gov
Heidi Yaqub	ADOT MPD	6027127644		
Asad Kurzia	ADOT MPD	602 712 6799		
Margaret Ittelson	HDR	602.474.3916		margaret.ittelson@hdrinc.com
Mark Hoffman	ADOT	602 712 7457		MHoffman@azdot.gov
Kimberly Bodington	AECOM	6026482580		kimberly.bodington@aecom
Call in Dee Crumbacher Marisa Deal	ADOT			

Name	Organization	Telephone	Address	Email
Tazeen Dewan	ADOT MPD	602-712 8542		tdewan@azdot.gov
Jay Melton	WSP | PB	480 921 6875		
Brian Miller	FHWA	602 382 8987		brian.miller@dot.gov
Romare Truely	FHWA	602 382 8978		romare.truely@dot.gov
Tom Deterding	"	602-382-8571		thomas.deterding@dot.gov
Raul Amavisca	ADOT CMS	602-204-2543		RAmavisca@azdot.gov
Dillon Kennedy	ADOT - MPD	602-712 7486		dkennedy@azdot.gov
Kerry Wilcoxon	ADOT-TSS	602 712-2060	Traffic Safety	kwilcoxon@azdot.gov
Brian Snider	Wilson + Co.			brian.snider@wilsonco.com
Amy Moran	Wilsent Co	602 283 2722		Amy.moran@wilsonco.com
Michael LaBianca	HDR			
Eric Sweat	Kimley-Horn			Eric.Sweat@kimley-horn.com

Corridor Profile Studies
Rd 3 TAC Meeting #8
Agenda
December 1, 2016
Conference Call # - 1.888.369.1427
Access Code – 5207537#

I. **Introductions**

II. **Corridor Profile Study Overview**

   a. Statewide Program

   b. Rounds 1, 2, 3

III. **Review of Round 3, *Task 6 and Task 7 Solution Evaluation and Prioritization***

   a. Working Paper #6

   b. Methodology

   c. Results

      i. *I-10/SR 85: California State Line to I-8*

      ii. *I-10 East: SR 202 to New Mexico State Line*

      iii. *US 60/US 70/US 191: Florence Junction to Douglas*

      iv. *US 93/US 60: Nevada State Line to SR 303*

      v. *SR 87/SR 260/ SR 377: SR 202 to I-40*

   d. Questions and Discussion

IV. **Next Steps**

ADOT MPD CORRIDOR PROFILE STUDIES

Round 3: I-10W/SR 85; I-10E; US 60/US 70/US 191; US 93/US 60; and SR 87/SR 260/SR 377

Technical Advisory Committee (TAC) Meeting

Thursday, December 1, 2016

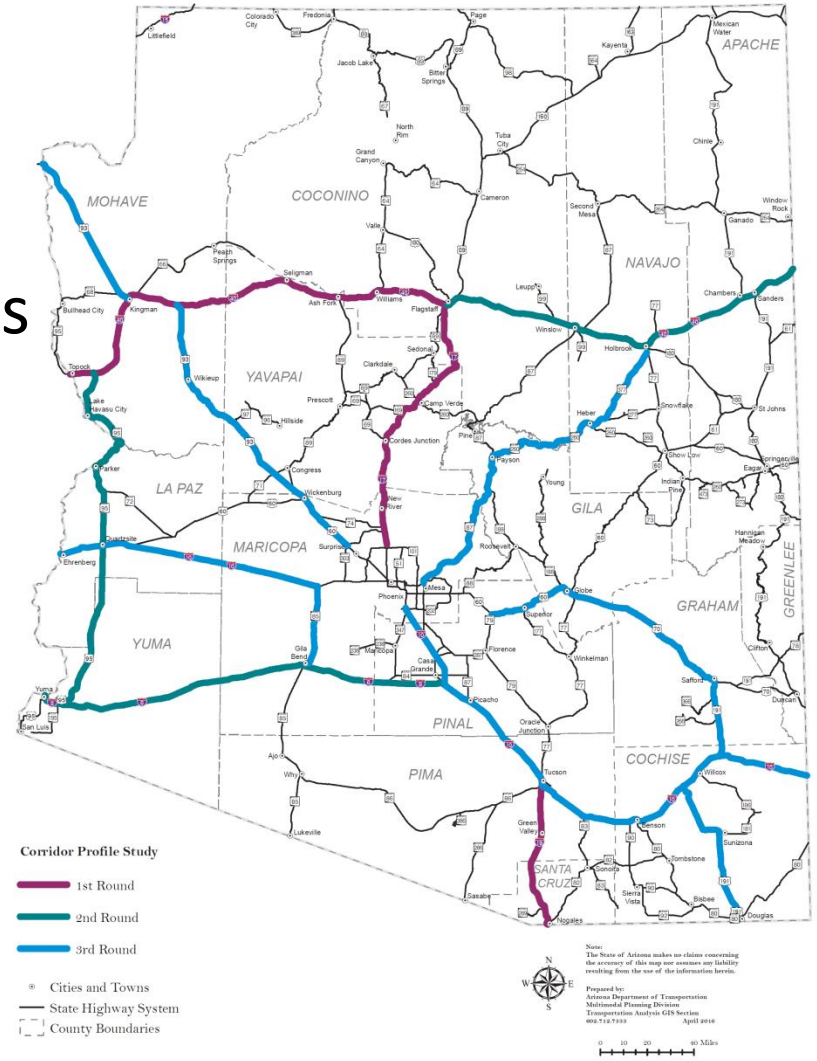
2:00pm – 3:30pm

Agenda

1. Introductions
2. Overview and Purpose of the Corridor Profile Studies
3. Review of Round 3 Studies ***Solution Evaluation and Prioritization*** (Working Paper 6)
4. Questions/Discussion
5. Next Steps

Overview of Corridor Profile Studies

- Performance-based analysis that identifies strategic improvements
- Status of 11 strategic corridors
  - Round 1 (magenta): Draft Report on ADOT website
  - Round 2 (green): Solution Evaluation & Prioritization
  - Round 3 (blue): Strategic Solutions



Corridor Profile Study Purpose

- Transparent, defensible, logical, reproducible process for identifying solutions for future programming
- Linking planning to programming to use available funds more effectively
- Identify system performance needs that will drive decision making
- Assist with implementation of MAP-21 requirements
- Nominate **strategic solutions** for consideration in program *(Solutions will require additional scoping after nomination)*

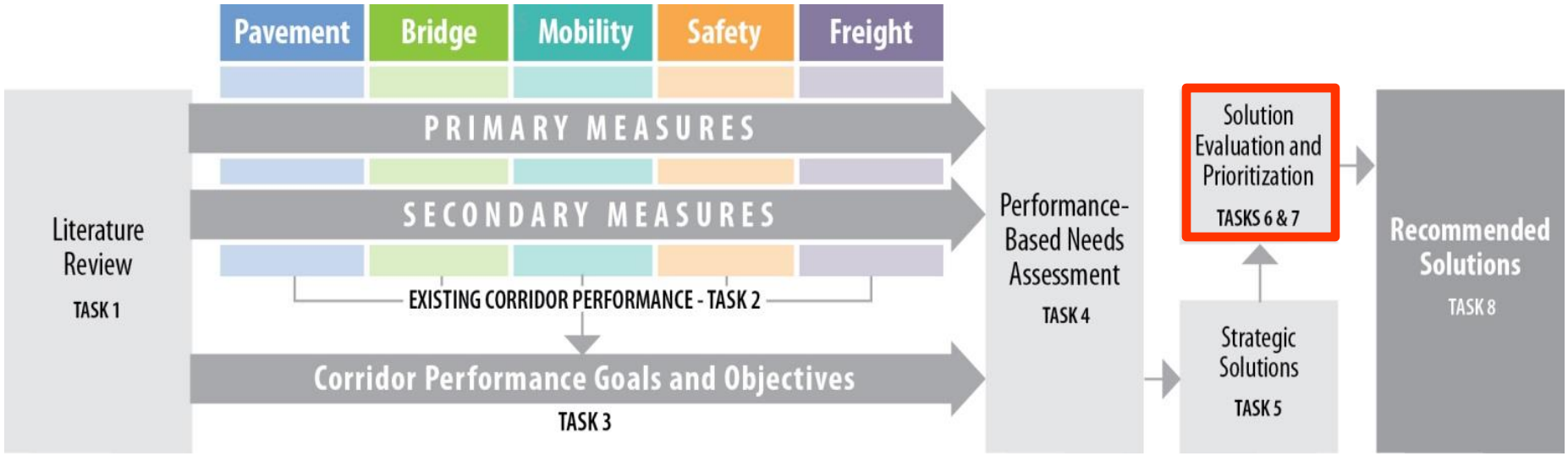
Solution Evaluation and Prioritization (Task 6 & Task 7)

Round 3 Corridors

- I-10W: California State Line to SR 85 & SR 85: I-10 to I-8
- I-10E: SR 202L to the New Mexico State Line
- US 60/US 70: SR 79 to US191 & US191: US 70 to SR 80
- US 93/US 60: Nevada State Line to SR 303L
- SR 87/SR 260/SR 377: SR 202L to I-40

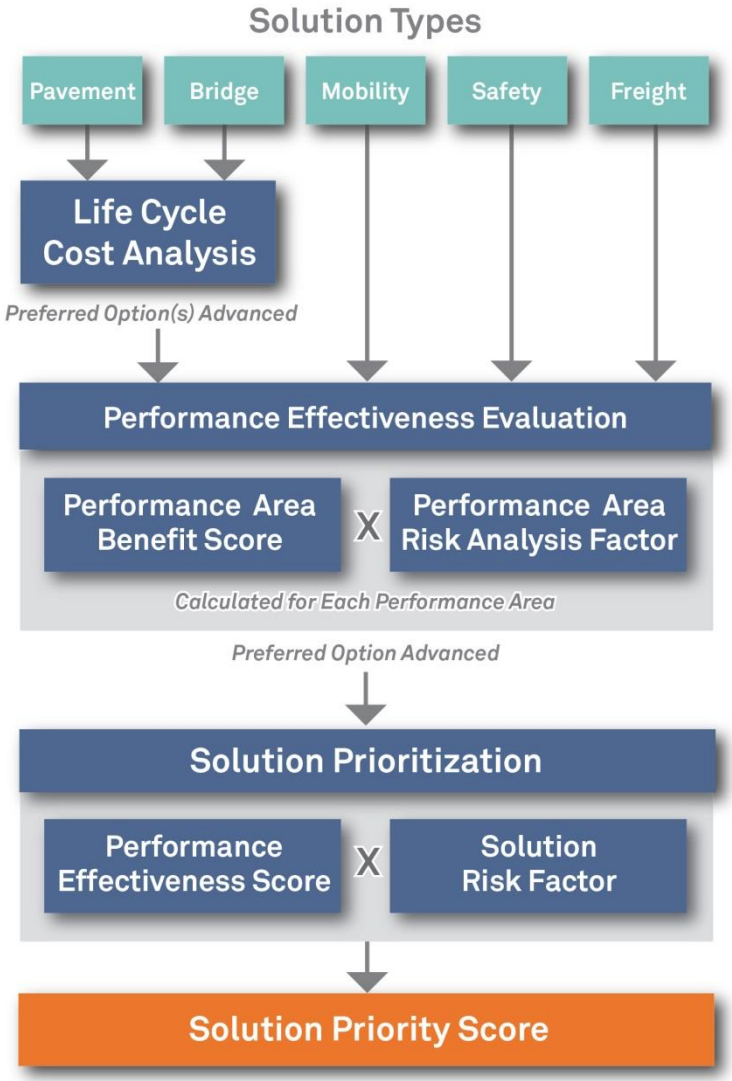
➢ ***Comments due on Working Paper 6 – Friday, December 9, 2016***

Performance Framework Overview

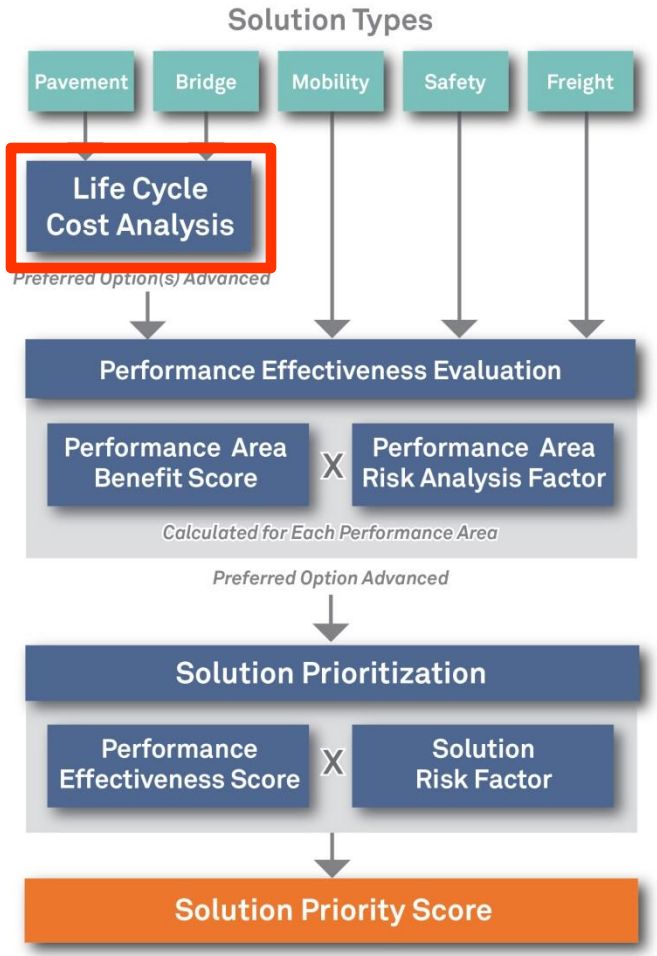


Solution Evaluation and Prioritization

Candidate Solution Evaluation Process

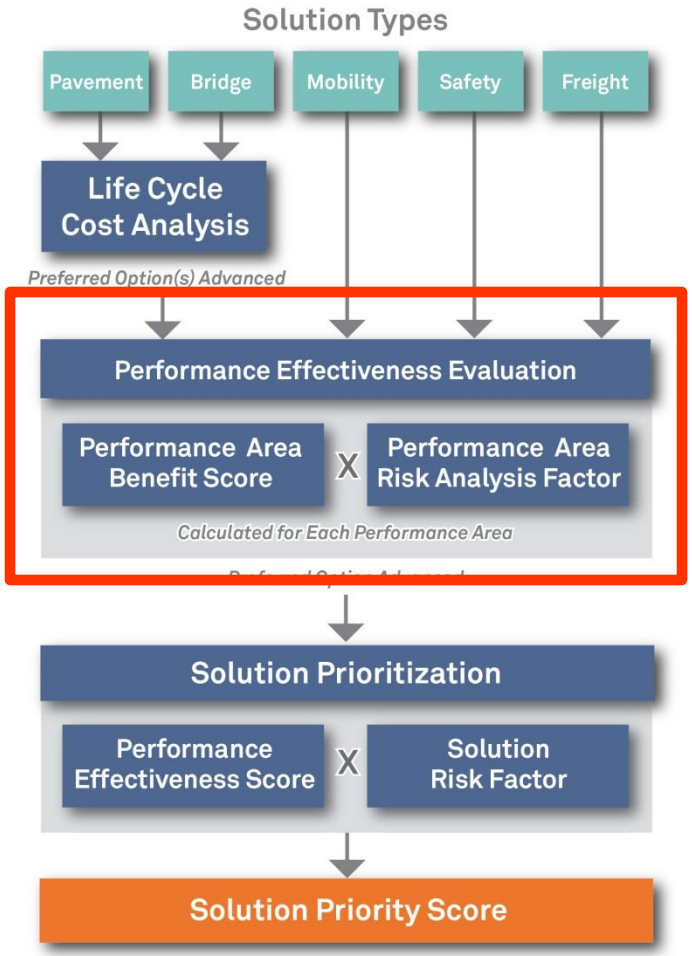


Candidate Solution Evaluation Process



- LCCA to evaluate Pavement and Bridge options – rehab vs. replace
- LCCA focus on agency costs over time
- Recommended replacement projects are considered strategic

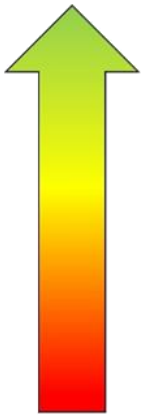
Candidate Solution Evaluation Process



- Measure of benefit to performance system vs. cost of candidate solution
- Reduction in segment level Need score for each Performance Area
- Performance area risk factors
- Results in Performance Effectiveness Score for each Candidate Solution

Candidate Solution Evaluation Process

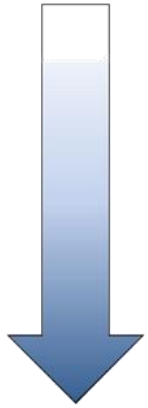
Performance increases (score based on scale of index)



Post-Solution Scores

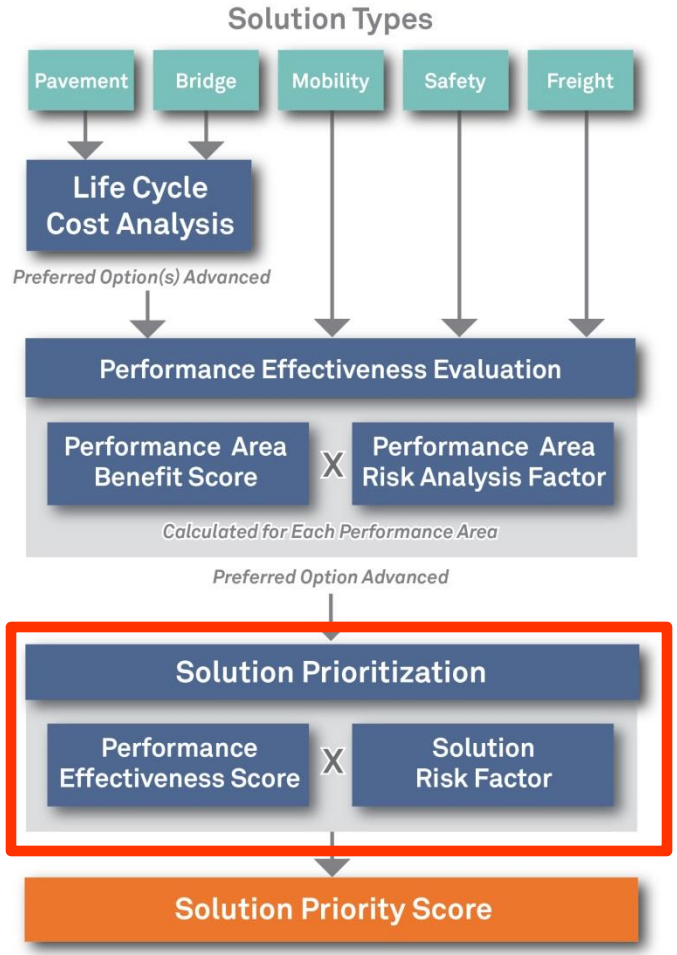
Performance Score	Performance Level	Level of Need	Need Score	Description
6.5	Good	None	0.0	All levels of Good and top 1/3 of Fair (>6.0)
	Good			
	Good			
	Fair			
	Fair	Low	1.0	Middle 1/3 of Fair (5.5-6.0)
5.0	Fair	Medium	2.0	Lower 1/3 of Fair and top 1/3 of Poor (4.5-5.5)
	Poor			
	Poor	High	3.0	Lower 2/3 of Poor (<4.5)
	Poor			

Existing Scores



Need increases (score based on fixed scale, generally 0 - 3)

Candidate Solution Evaluation Process

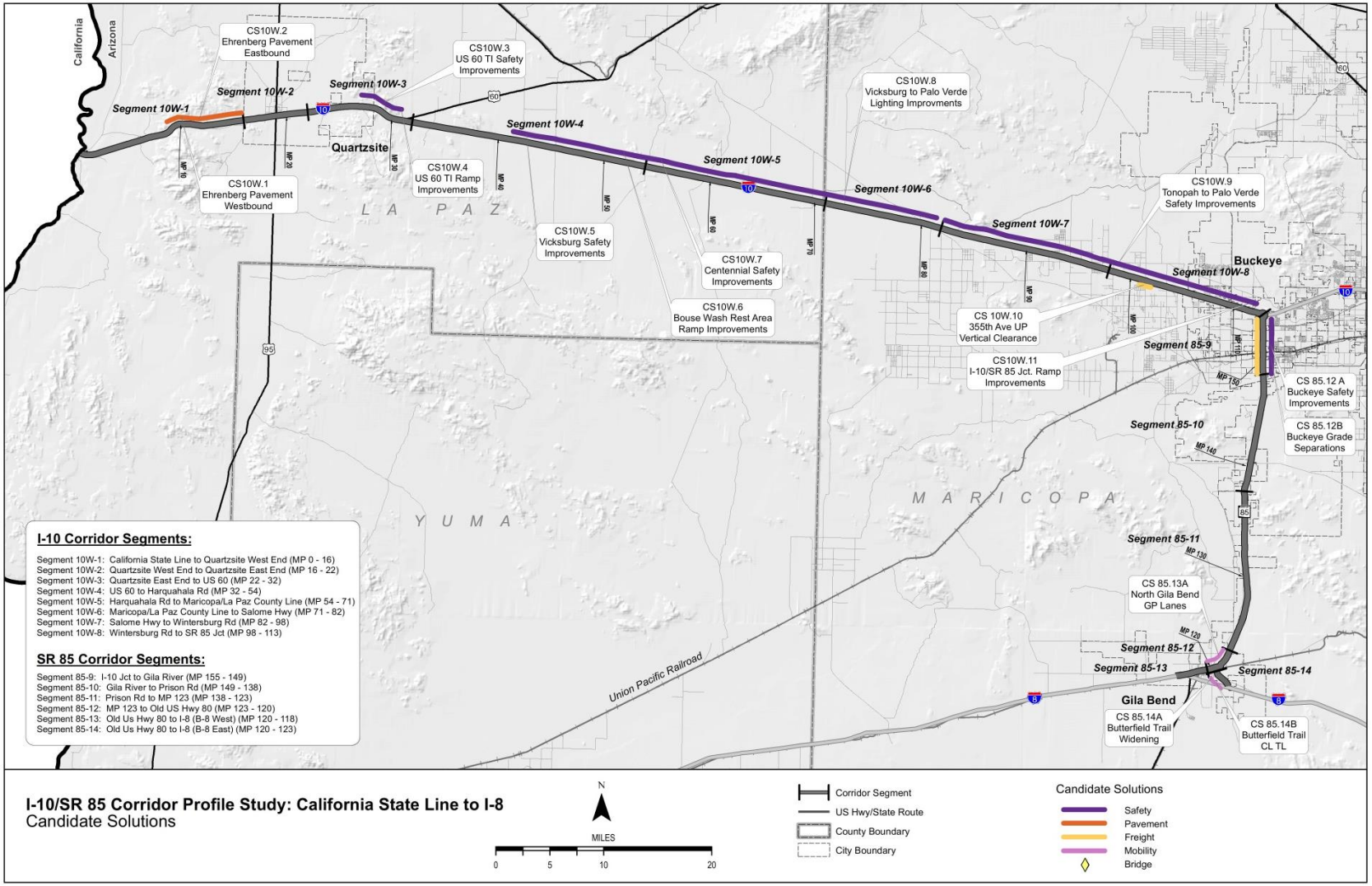


			Severity/Consequence				
			Insignificant	Minor	Significant	Major	Catastrophic
		Wght	1.00	1.10	1.20	1.30	1.40
Frequency/Likelihood	Very Rare	1.00	1.00	1.10	1.20	1.30	1.40
	Rare	1.10	1.10	1.21	1.32	1.43	1.54
	Seldom	1.20	1.20	1.32	1.44	1.56	1.68
	Common	1.30	1.30	1.43	1.56	1.69	1.82
	Frequent	1.40	1.40	1.54	1.68	1.82	1.96

Low	Moderate	Major	Severe
1.14	1.36	1.51	1.78

- Addresses risk of not implementing project
- Weighted on likelihood and severity of failure
- **PES x Risk Factor x Segment Need = Priority Score**

I-10/SR 85 Candidate Strategic Solutions



I-10/SR 85 Life Cycle Cost Analysis (LCCA)

Bridge LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)			Ratio of Present Value Compared to Lowest Present Value			Other Needs	Results
	Replace	Rehab	Repair	Replace	Rehab	Repair		
No LCCA conducted for any bridge candidate solution on the I-10/SR 85 corridor								

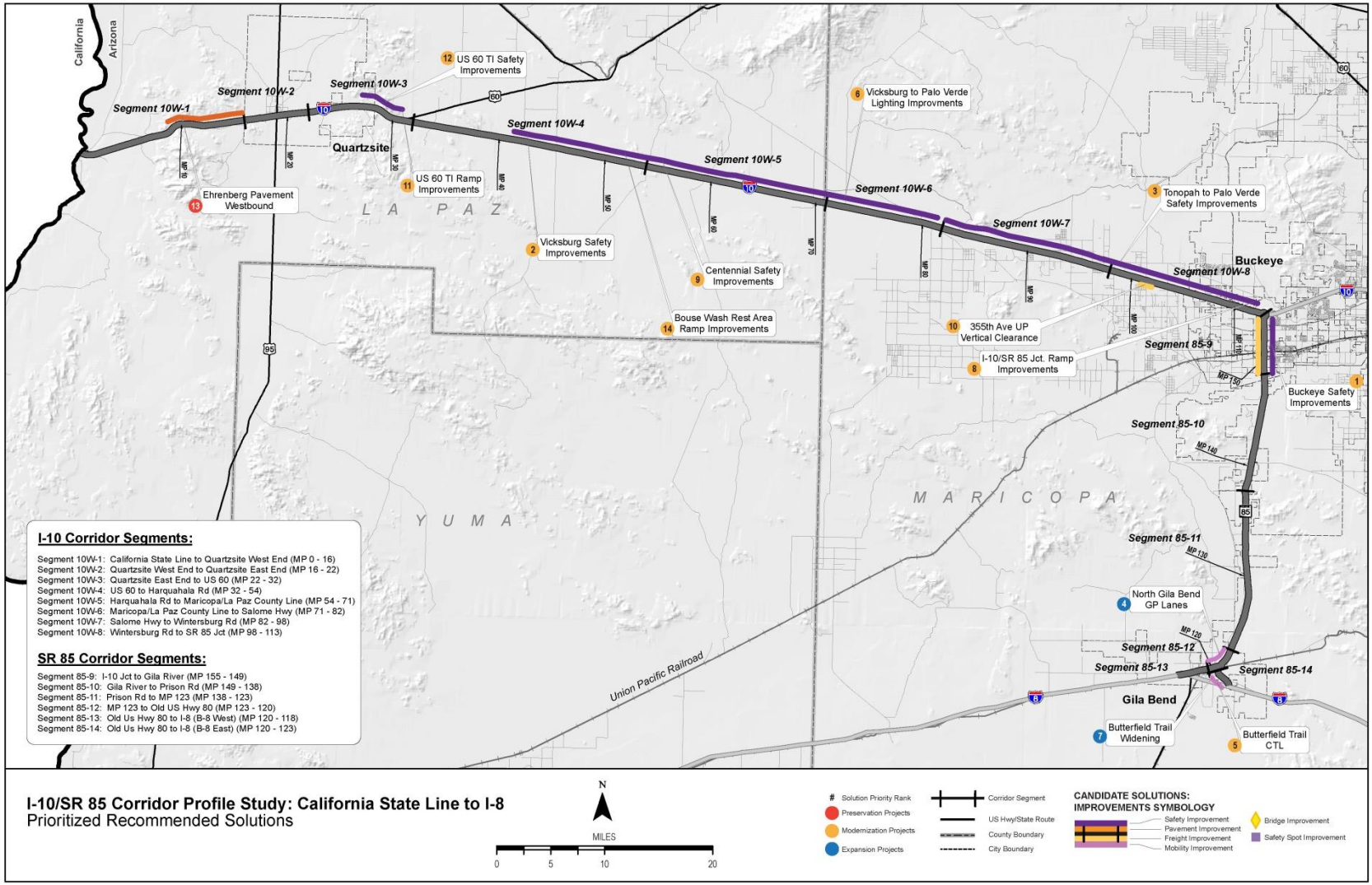
Pavement LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)				Ratio of Present Value Compared to Lowest Present Value				Other Needs	Results
	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation		
Ehrenberg Pavement WB (MP 9 – 16)	$30,783,900	**$28,183,400**	$28,610,900	$28,690,200	1.09	1.00	1.02	1.02	N	Carry forward reconstruction
Ehrenberg Pavement EB (MP 12 – 16)	$17,590,800	$16,104,800	$13,298,300	**$14,068,800**	1.32	1.21	1.00	1.06	N	Not strategic

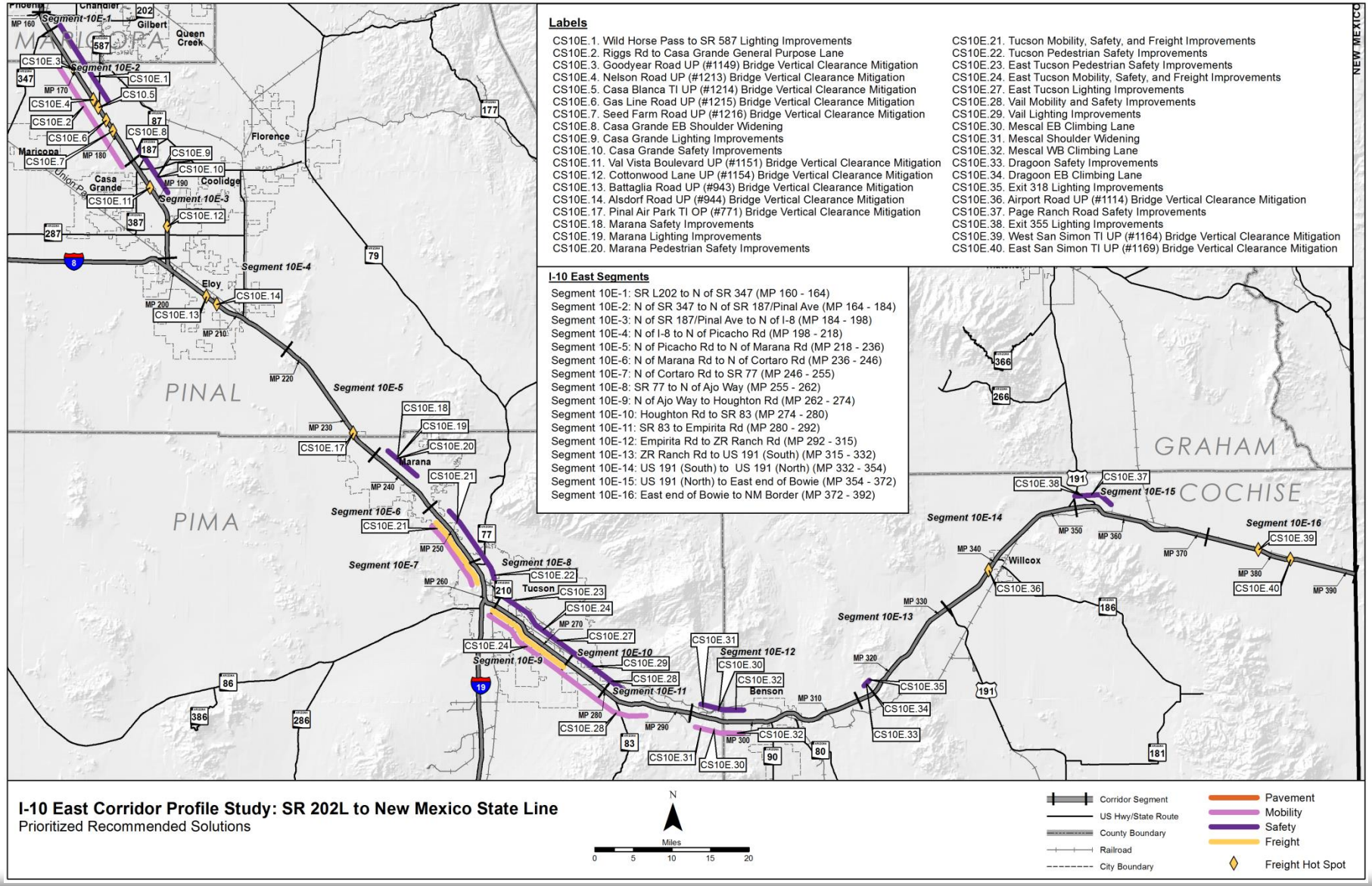
I-10/SR 85 Prioritized Project List

Rank	Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost (in millions)	Prioritization Score
1	85.12A	Buckeye Safety Improvements	154-149	3.6	**119**
2	10W.5	Vicksburg Safety Improvements	32-50	9.0	**106**
3	10W.9	Tonopah to Palo Verde Safety Improvements	82-112	15	**95**
4	85.13	N Gila Bend General Purpose Lanes	120-123	22.4	**71**
5	85.14B	Butterfield Trail CTL	120-123	7.2	**50**
6	10W.8	Vicksburg to Palo Verde Lighting Improvements	54-103	2.5	**39**
7	85.14A	Butterfield Trail Widening	120-123	11.8	**37**
8	10W.11	I-10/SR 85 Junction Ramp Improvements	112-113	4.4	**16**
9	10W.7	Centennial Safety Improvements	54-71	36.5	**13**
10	10W.10	355th Ave UP Vertical Clearance	101.4	3.6	**10**
11	10W.4	US 60 Interchange Ramp Improvements	31	15.6	**5**
12	10W.3	US 60 Interchange Safety Improvements	27-31	4.4	**8**
13	10W.1	Ehrenberg Pavement WB	9-16	28.3	**3**
14	10W.6	Bouse Wash Rest Area Ramp Improvements	52.5	4.4	**3**
NR	*85.12B*	*Buckeye Grade Separations*	*154-149*	*81.8*	

I-10/SR 85 Prioritized Recommended Solutions



I-10 East Candidate Strategic Solutions



I-10 East Life Cycle Cost Analysis (LCCA)

Bridge LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)			Ratio of Present Value Compared to Lowest Present Value			Other Needs	Results
	Replace	Rehabilitate	Repair	Replace	Rehabilitate	Repair		
Drain Channel Bridge WB (CS10E.15, MP 209.85)	$1,170,000	$1,010,000	$820,000	1.43	1.24	1	No	Not strategic as stand-alone solution and no other needs—no further evaluation
Red Rock TI Bridge (CS10E.16, MP 226.45)	$1,470,000	$1,430,000	$1,110,000	1.32	1.29	1	No	Not strategic as stand-alone solution and no other needs—no further evaluation
Ajo Way TI Bridge EB (CS10E.25, MP 262.44)	$4,680,000	$4,220,000	3,260,000	1.44	1.3	1	Yes	Not strategic as a stand-alone solution; carry forward for further evaluation with other needs
Ajo Way TI Bridge WB (CS10E.26, MP 262.44)	$4,680,000	$4,180,000	$3,240,000	1.45	1.29	1	Yes	Not strategic as a stand-alone solution; carry forward for further evaluation with other needs

Pavement LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)				Ratio of Present Value Compared to Lowest Present Value				Other Needs	Results
	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation		
No LCCA conducted for any pavement candidate solutions on the I-10 East corridor										

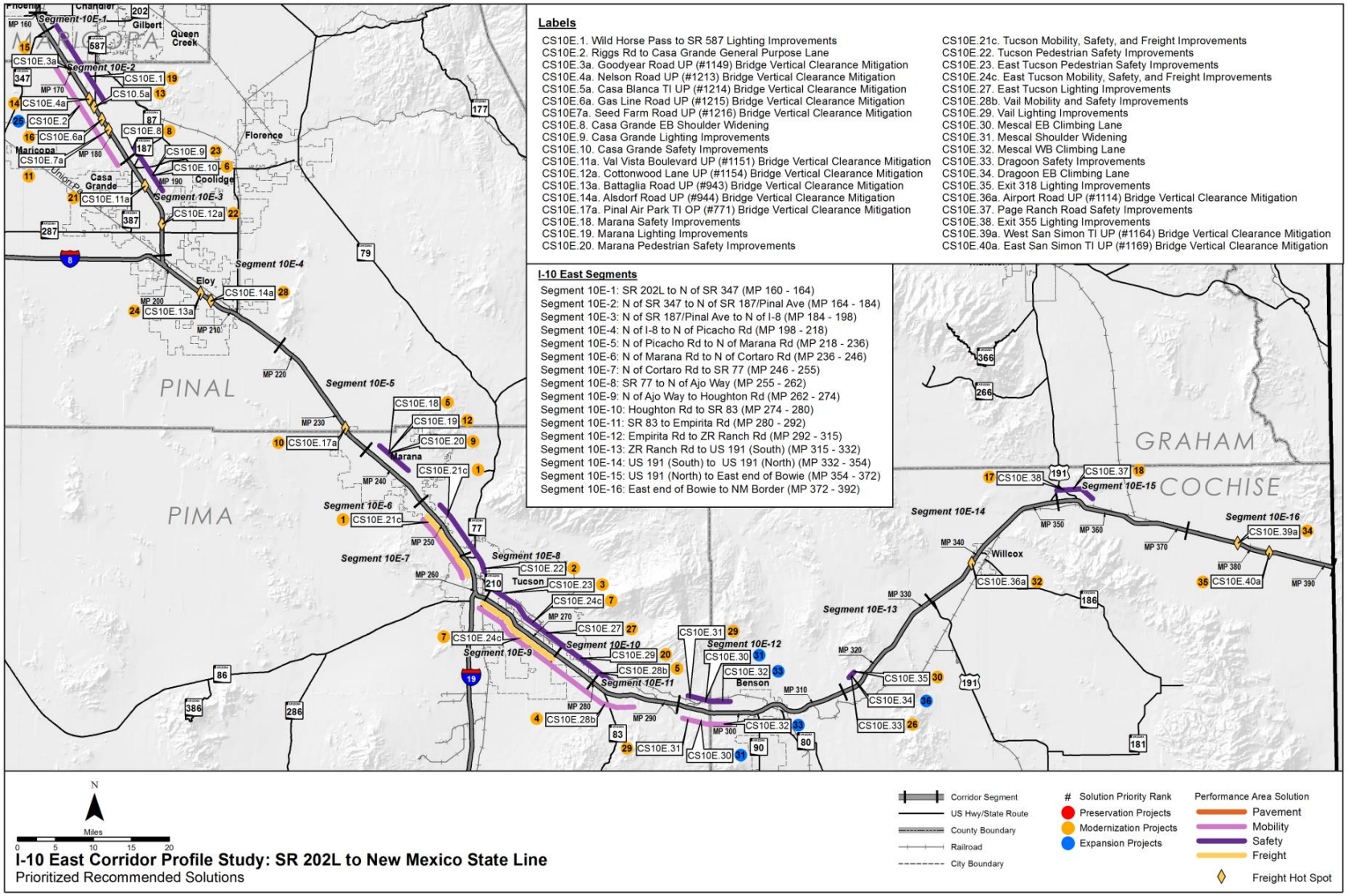
I-10 East Prioritized Project List

Rank	Candidate Solution #	Candidate Solution Name	Milepost Location	Cost ($ millions)	Prioritization Score
1	CS10E.21c	Tucson Mobility, Safety, and Freight Improvements	248–258	10.4	228.7
2	CS10E.22	Tucson Pedestrian Safety Improvements	257–258	2.6	156.8
3	CS10E.23	East Tucson Pedestrian Safety Improvements	262–264	2.4	155.2
4	CS10E.28b	Vail Mobility and Safety Improvements	274–286	16.3	153
5	CS10E.18	Marana Safety Improvements	237–242	3.3	149.4
6	CS10E.10	Casa Grande Safety Improvements	184–190	3.7	98.7
7	CS10E.24c	East Tucson Mobility, Safety, and Freight Improvements	262–274	17	92.7
8	CS10E.8	Casa Grande EB Shoulder Widening	183–184	0.6	82
9	CS10E.20	Marana Pedestrian Improvements	237–242	2	79.3
10	CS10E.17a	Pinal Air Park TI UP (#771) Bridge Vertical Clearance	232.02	2.8	56.3
11	CS10E.7a	Seed Farm Road UP (#1216) Bridge Vertical Clearance	179.37	2.9	46.1
12	CS10E.19	Marana Lighting Improvements	237–242	6.7	38.8
13	CS10E.5a	Casa Blanca TI UP (#1214) Bridge Vertical Clearance	175.81	3.3	37
14	CS10E.4a	Nelson Road UP (#1213) Bridge Vertical Clearance	174.63	3	35.7
15	CS10E.3a	Goodyear Road UP (#1149) Bridge Vertical Clearance	169.85	3	35.6
16	CS10E.6a	Gas Line Road UP (#1215) Bridge Vertical Clearance	177.76	4.4	34.5
17	CS10E.38	Exit 355 Lighting Improvements	355	0.2	33.1
18	CS10E.37	Page Ranch Road Safety Improvements	354–358	3.3	29

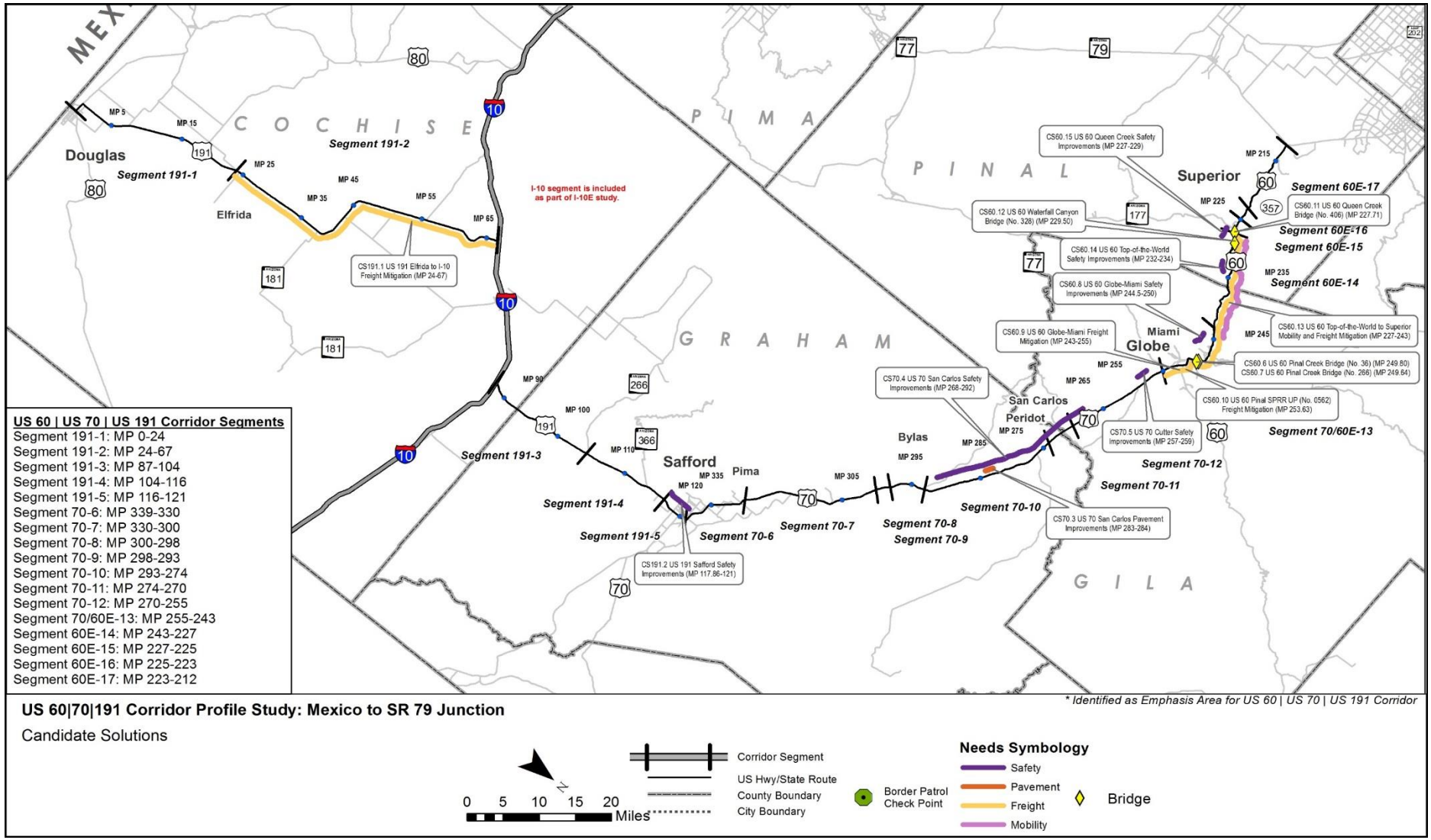
I-10 East Prioritized Project List

Rank	Candidate Solution #	Candidate Solution Name	Milepost Location	Cost ($ millions)	Prioritization Score
19	CS10E.1	Wild Horse Pass to SR 587 Lighting Improvements	163–176	8.7	28.4
20	CS10E.29	Vail Lighting Improvements	275–279	0.6	24.2
21	CS10E.11a	Val Vista Blvd UP (#1151) Bridge Vertical Clearance	188.2	3.2	21
22	CS10E.12a	Cottonwood Lane UP (#1154) Bridge Vertical Clearance	193.88	2.5	20.3
23	CS10E.9	Casa Grande Lighting Improvements	183–190	4.7	20.3
24	CS10E.13a	Battaglia Road UP (#943) Bridge Vertical Clearance	205.45	4.2	18.8
25	CS10E.2	Riggs Road to Casa Grande General Purpose Lane	167–184	202.8	18.8
26	CS10E.33	Dragoon Safety Improvements	317–318	1.2	17.3
27	CS10E.27	East Tucson Lighting Improvements	263–274	14.8	17.3
28	CS10E.14a	Alsdorf Road UP (#944) Bridge Vertical Clearance	207.17	4.2	16.2
29	CS10E.31	Mescal Shoulder Widening	293–299	7.6	13.1
30	CS10E.35	Exit 318 Lighting Improvements	318	0.3	9.2
31	CS10E.30	Mescal EB Climbing Lane	293–296	13.5	8.9
32	CS10E.36a	Airport Road UP (#1114) Bridge Vertical Clearance	339.46	3.4	8.7
33	CS10E.32	Mescal WB Climbing Lane	296–299	13.5	3.9
34	CS10E.39a	W San Simon TI UP (#1164) Bridge Vertical Clearance	378.93	3.5	3.7
35	CS10E.40a	E San Simon TI UP (#1169) Bridge Vertical Clearance	383.35	3.3	3.7
36	CS10E.34	Dragoon EB Climbing Lane	317-318	6.4	1.6

I-10 East Prioritized Recommended Solutions



US 60/US 70/US 191 Candidate Strategic Solutions



US 60 | US 70 | US 191 Corridor Segments

Segment 191-1: MP 0-24
Segment 191-2: MP 24-67
Segment 191-3: MP 87-104
Segment 191-4: MP 104-116
Segment 191-5: MP 116-121
Segment 70-6: MP 339-330
Segment 70-7: MP 330-300
Segment 70-8: MP 300-298
Segment 70-9: MP 298-293
Segment 70-10: MP 293-274
Segment 70-11: MP 274-270
Segment 70-12: MP 270-255
Segment 70/60E-13: MP 255-243
Segment 60E-14: MP 243-227
Segment 60E-15: MP 227-225
Segment 60E-16: MP 225-223
Segment 60E-17: MP 223-212

US 60|70|191 Corridor Profile Study: Mexico to SR 79 Junction

Candidate Solutions

** Identified as Emphasis Area for US 60 | US 70 | US 191 Corridor*

0 5 10 15 20 Miles

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

Border Patrol Check Point

Needs Symbology
Safety
Pavement
Freight
Mobility
Bridge

US 60/US 70/US 191 Life Cycle Cost Analysis (LCCA)

Bridge LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)			Ratio of Present Value Compared to Lowest Present Value			Other Needs	Results
	Replace	Rehab	Repair	Replace	Rehab	Repair		
US 60 Pinal Creek Bridge (No. 36)	Considered a strategic solution to replace due to bridge age (1920)							
US 60 Pinal Creek Bridge (No. 266)	Considered a strategic solution to replace due to bridge age (1942)							
US 60 Queen Creek Bridge (No. 406)	Considered a strategic solution to replace due to bridge age (1949)							
US 60 Waterfall Canyon Bridge (No. 328)	Considered a strategic solution to replace due to bridge age (1929)							

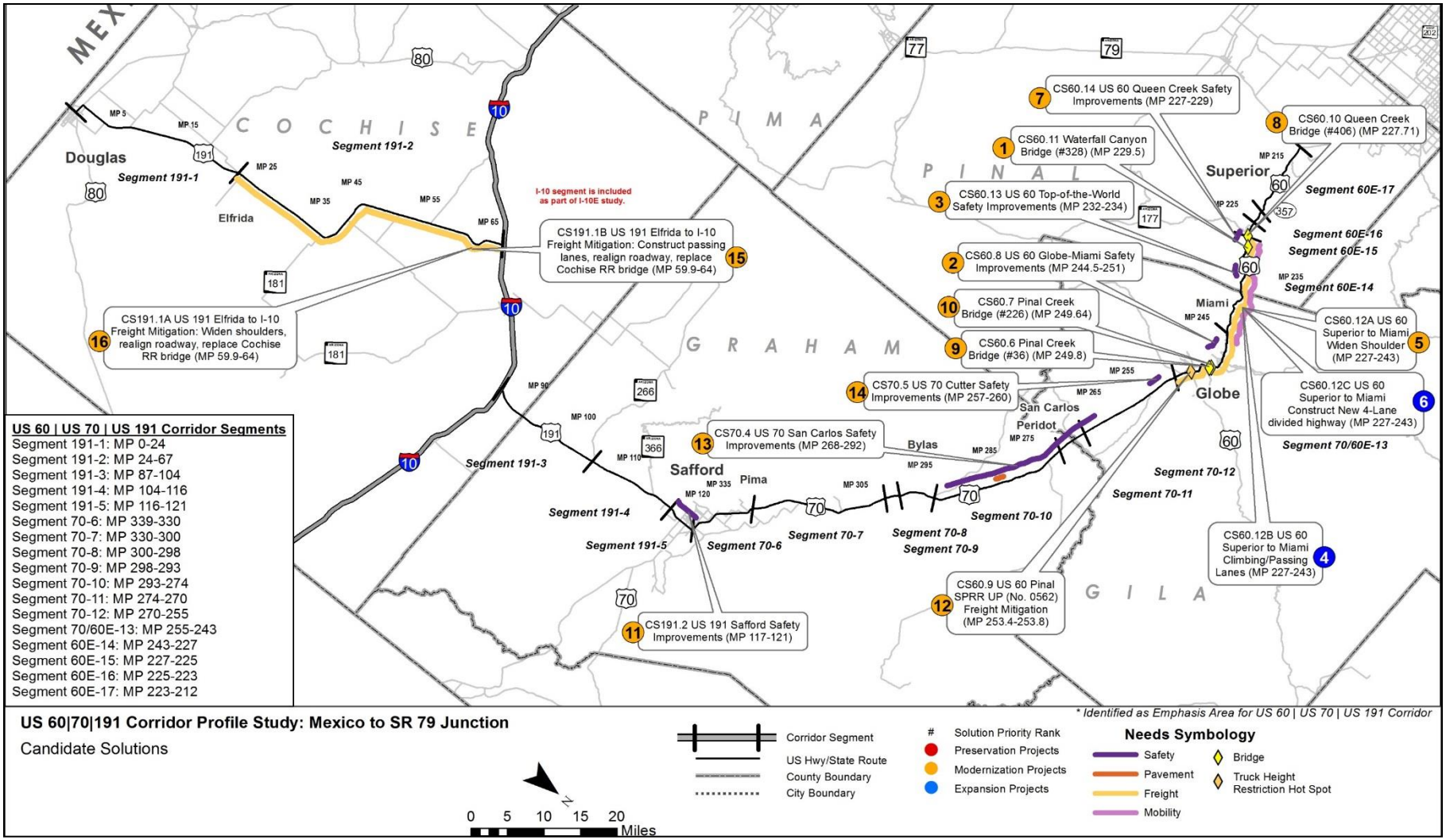
Pavement LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)				Ratio of Present Value Compared to Lowest Present Value				Other Needs	Results
	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation		
US 60 San Carlos Pavement Improvement (CS70.3, MP 283 to 284)	$4.4M	$4.1M	$3.3M	$3.4M	1.40	1.28	1.00	1.09	No	Reconstruction is not within 15% of lowest cost - Rehabilitation is recommended

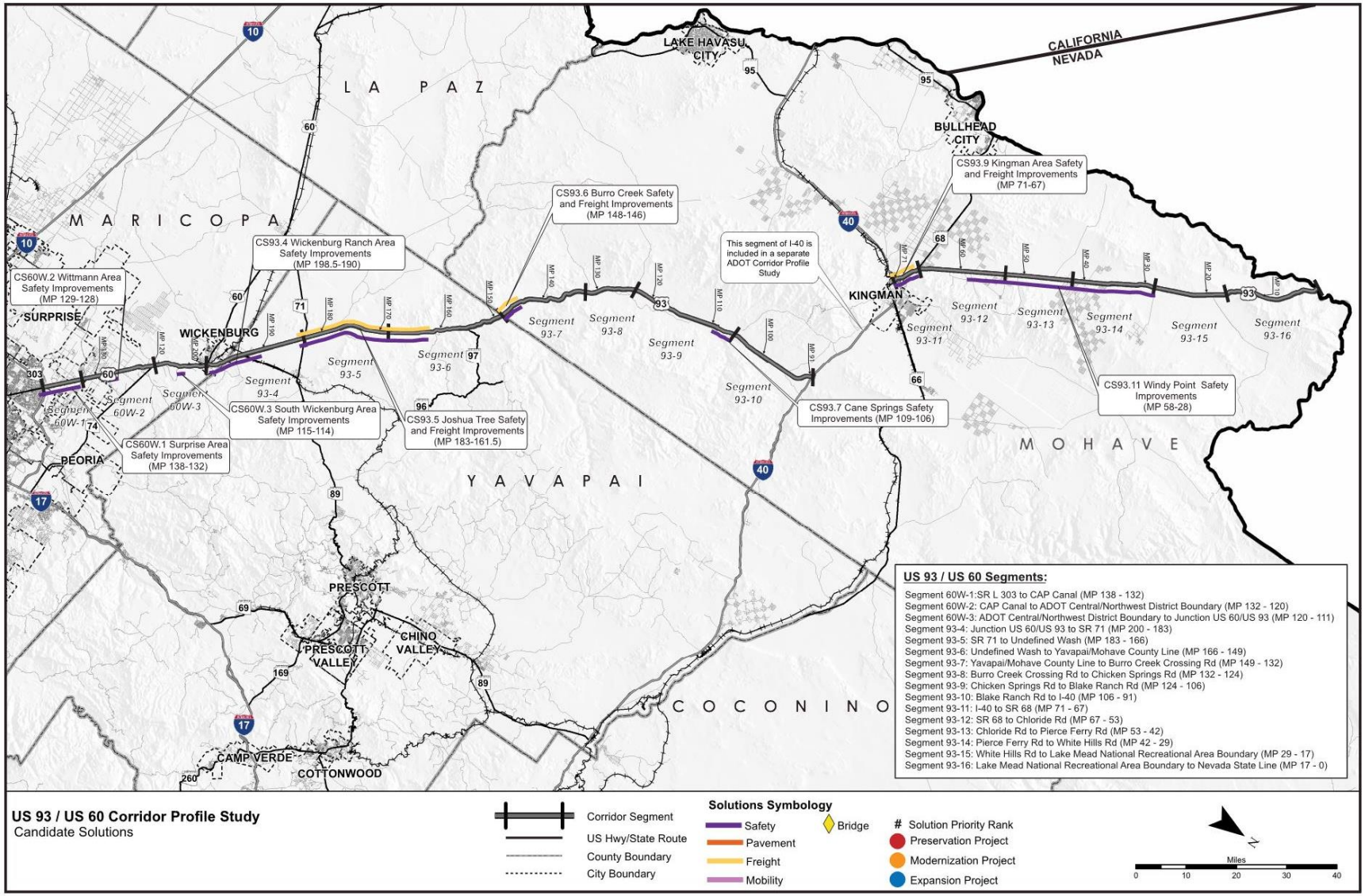
US 60/US 70/US 191 Prioritized Project List

Rank	Candidate Solution #	Candidate Solution Name	MP	Cost ($ million)	Prioritization Score
1	60.11	Waterfall Canyon Bridge (#328)	229.5	$1.7	506
2	60.8	US 60 Globe-Miami Safety Improvements	244.5-251	$10.2	440
3	60.13	US 60 Top-of-the-World Safety Improvements	232-234	$1.0	435
4	60.12B	US 60 Superior to Miami Climbing/Passing Lanes	227-243	$113.6	350
5	60.12A	US 60 Superior to Miami Widen Shoulder	227-243	$11.3	303
6	60.12C	US 60 Superior to Miami Four-Lane Divided	227-243	$157.2	264
7	60.14	US 60 Queen Creek Safety Improvements	227-229	$2.7	164
8	60.10	Queen Creek Bridge (#406)	227.71	$8.8	127
9	60.6	Pinal Creek Bridge (#36)	249.8	$2.4	123
10	60.7	Pinal Creek Bridge (#226)	249.64	$3.1	117
11	191.2	US191 Safford Safety Improvements	117-121	$1.4	114
12	60.9	US 60 Pinal SPRR UP (No. 0562) Freight Mitigation	253.4-253.8	$1.1	44
13	70.4	US 70 San Carlos Safety Improvements	268-292	$46.1	34
14	70.5	US 70 Cutter Safety Improvements	257-260	$5.6	27
15	191.1B	US 191 Elfrida to I-10 Freight Mitigation: Construct passing lanes, realign roadway, replace Cochise RR bridge	59.9-64	$121.5	2
16	191.1A	US 191 Elfrida to I-10 Freight Mitigation: Widen shoulders, realign roadway, replace Cochise RR bridge	59.9-64	$105.6	2

US 60/US 70/US 191 Prioritized Recommended Solutions



US 93/US 60 Candidate Strategic Solutions



US 93/US 60 Life Cycle Cost Analysis (LCCA)

Bridge LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)			Ratio of Present Value Compared to Lowest Present Value			Other Needs	Results
	Replace	Rehab	Repair	Replace	Rehab	Repair		
No LCCA conducted for any bridge candidate solution on the US 93/US 60 corridor								

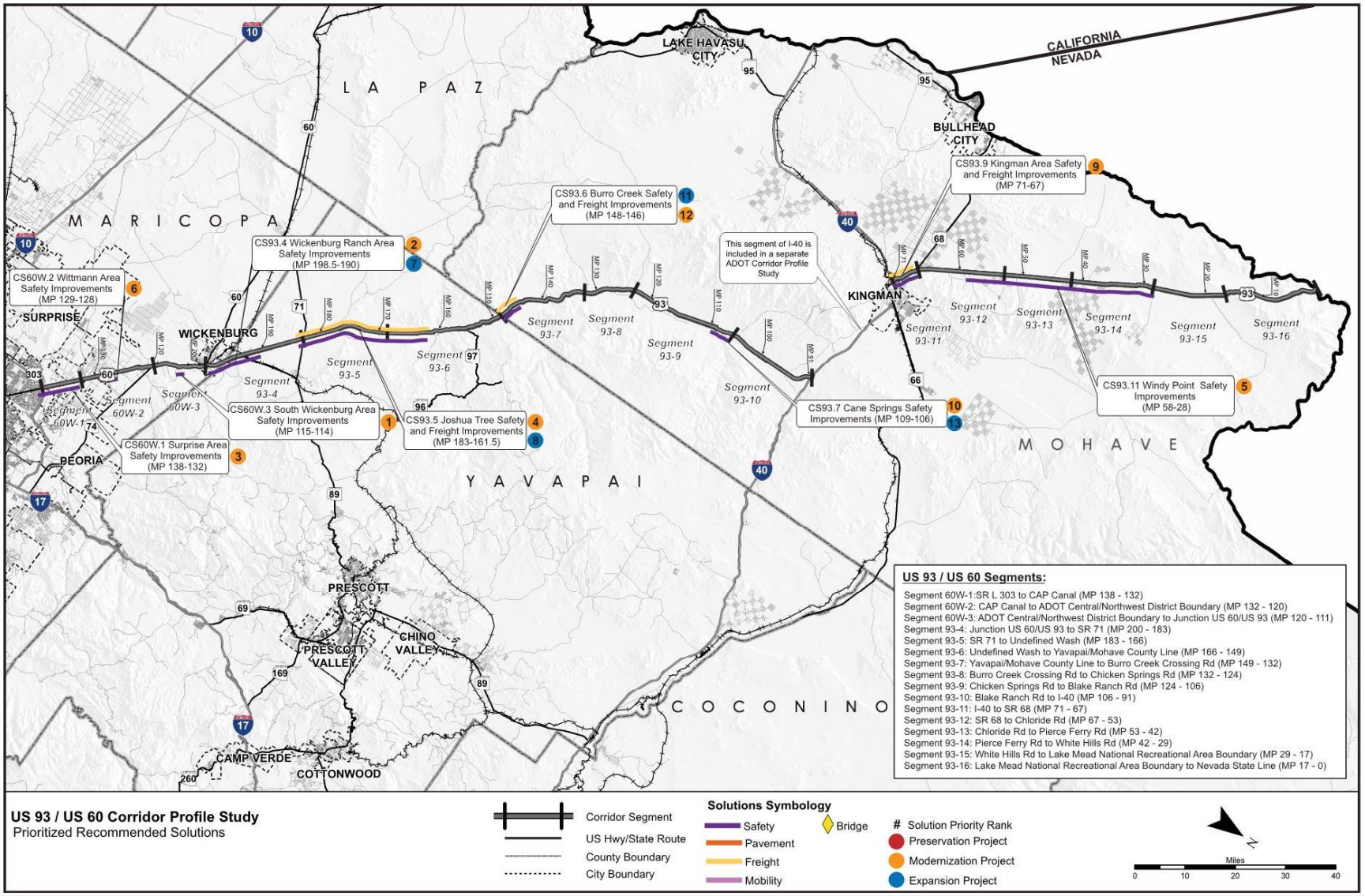
Pavement LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)				Ratio of Present Value Compared to Lowest Present Value				Other Needs	Results
	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation		
Kingman Pavement CS93.8 (MP 71 – 70)	$8,795,411	$9,280,089	$8,291,875	**$7,456,268**	1.17	1.23	1.09	1.00	N	Not strategic – Rehab recommended
Cerbat Wash Pavement CS93.10 (MP 61 – 60)	$8,795,411	$7,792,620	$6,367,462	**$6,310,821**	1.39	1.23	1.01	1	N	Not strategic – Rehab recommneded

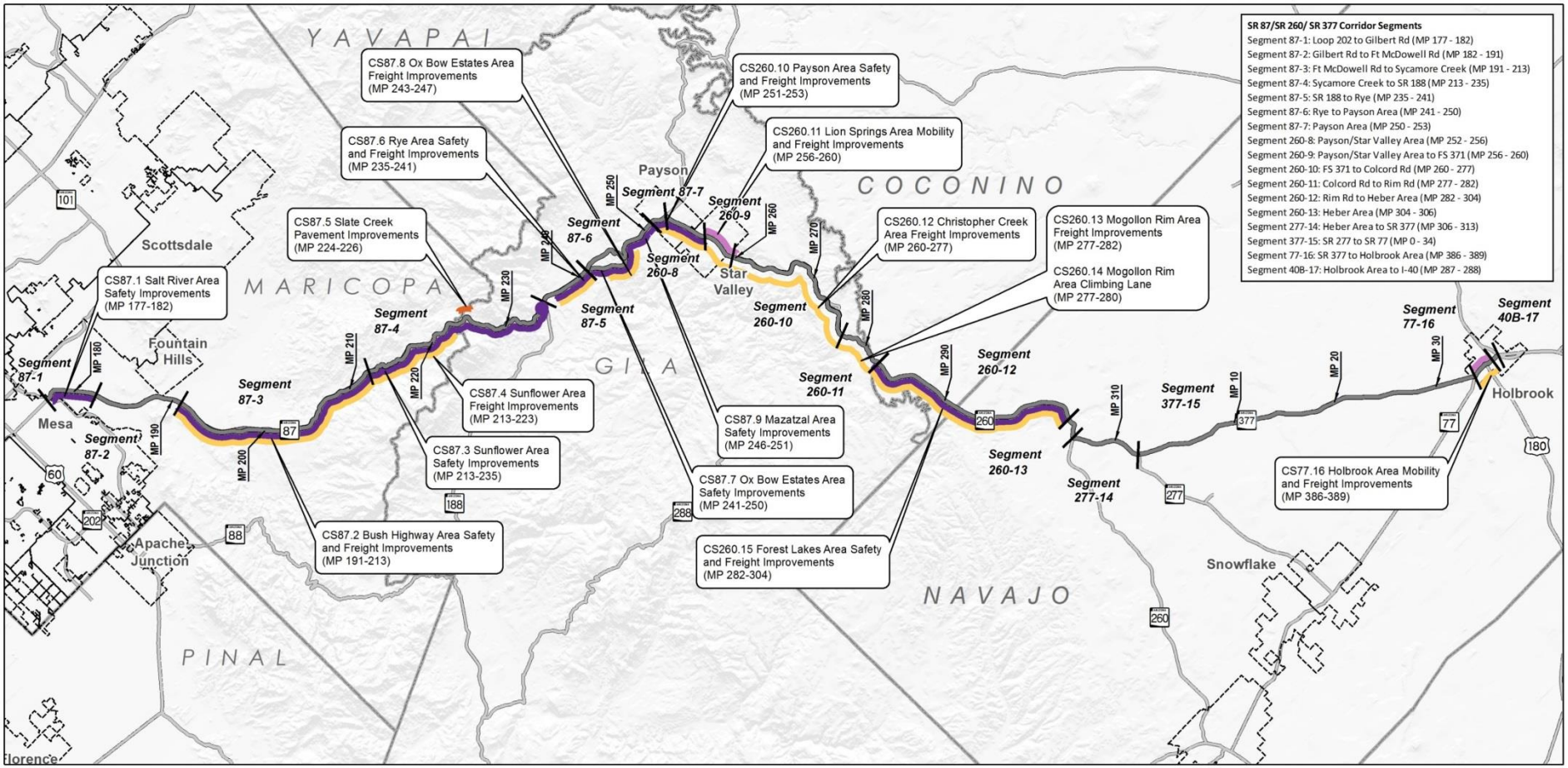
US 93/US 60 Prioritized Project List

Rank	Candidate Solution #	Candidate Solution Name	Milepost Location	Cost ($ millions)	Prioritization Score
1	CS60W.3	South Wickenburg Area Safety Improvements	115	0.88	326
2	CS93.4-B	Wickenburg Ranch Area Safety Improvements	198.5	5.16	157
3	CS60W.1	Surprise Area Safety Improvements	138	6.25	141
4	CS93.5-B	Joshua Tree Safety and Freight Improvements	183	24.75	114
5	CS93.11	Windy Point Safety Improvements	58	46.53	37
6	CS60W.2	Wittmann Area Safety Improvements	132	0.26	36
7	CS93.4-A	Wickenburg Ranch Area Safety Improvements	198.5	63.93	22
8	CS93.5-A	Joshua Tree Safety and Freight Improvements	183	163.07	16
9	CS93.9	Kingman Area Safety and Freight Improvements	71	45.00	10
10	CS93.7-B	Cane Springs Safety Improvements	109	10.18	4
11	CS93.6-B	Burro Creek Safety and Freight Improvements	147	7.42	4
12	CS93.6-A	Burro Creek Safety and Freight Improvements	147	2.98	2
13	CS93.7-A	Cane Springs Safety Improvements	109	46.63	1

US 93/US 60 Prioritized Recommended Solutions



SR 87/SR 260/SR 377 Candidate Strategic Solutions



SR 87/SR 260/SR 377 Corridor Profile Study: Loop 202 to I-40
Candidate Solutions

SR 87/SR 260/SR 377 Life Cycle Cost Analysis (LCCA)

Bridge LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)			Ratio of Present Value Compared to Lowest Present Value			Other Needs	Results
	Replace	Rehab	Repair	Replace	Rehab	Repair		
No LCCA conducted for any bridge candidate solution on the SR 87/SR 260/SR 377 corridor								

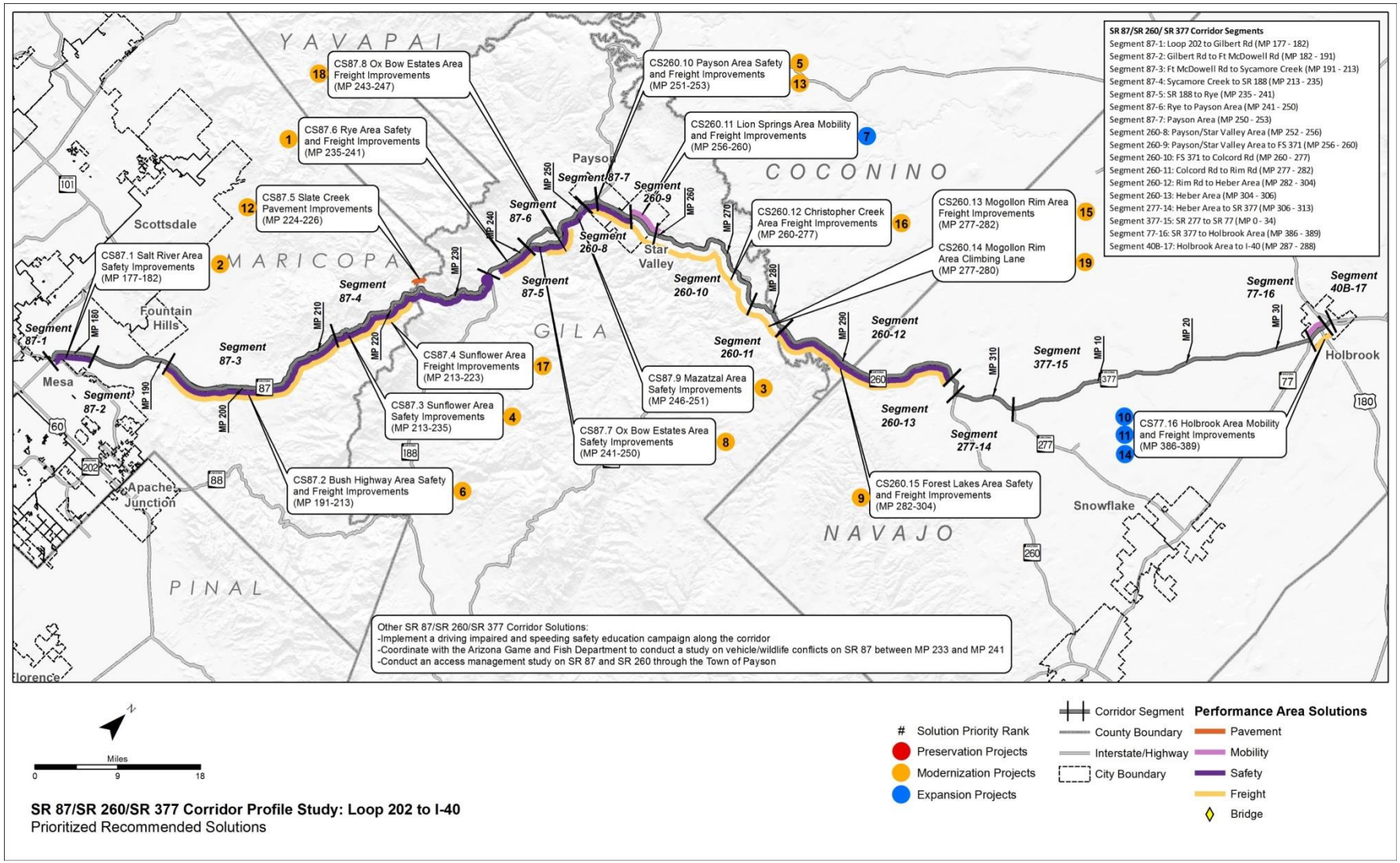
Pavement LCCA

Candidate Solution	Present Value at 3% Discount Rate ($)				Ratio of Present Value Compared to Lowest Present Value				Other Needs	Results
	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation		
Slate Creek Pavement Improvements (CS87.5, MP 224-226)	**$9,046,928**	$9,478,848	$9,224,966	$9,478,766	1.00	1.05	1.02	1.05	-	Concrete reconstruction is the lowest option and asphalt reconstruction is within 15% of the lowest rehabilitation cost

SR 87/SR 260/SR 377 Prioritized Project List

Rank	Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost (in millions)	Prioritization Score
1	CS87.6	Rye Area Safety and Freight Improvements	235-241	$0.2	241
2	CS87.1	Salt River Area Safety Improvements	177-182	$4.2	233
3	CS87.9	Mazatzal Area Safety Improvements	246-251	$2.3	225
4	CS87.3	Sunflower Area Safety Improvements	213-235	$18.3	189
5	CS260.10A	Payson Area Safety and Freight Improvements	251-253	$0.4	187
6	CS87.2	Bush Highway Area Safety and Freight Improvements	191-213	$6.8	182
7	CS260.11	Lion Springs Area Mobility and Freight Improvements	256-260	$50.0	170
8	CS87.7	Ox Bow Estates Area Safety Improvements	241-250	$2.4	133
9	CS260.15	Forest Lakes Area Safety and Freight Improvements	282-304	$56.5	130
10	CS77.16C	Holbrook Area Mobility and Freight Improvements (adjacent to SR 77)	386-389	$46.4	112
11	CS77.16A	Holbrook Area Mobility and Freight Improvements (SR 377/SR 77 connection)	386-389	$92.1	40
12	CS87.5B	Slate Creek Pavement Improvements (Replace)	224-226	$7.2	23
13	CS260.10B	Payson Area Safety and Freight Improvements	251-253	$13.8	23
14	CS77.16B	Holbrook Area Mobility and Freight Improvements (US 180/SR 77 connection)	386-389	$75.8	20
15	CS260.13	Mogollon Rim Area Freight Improvements	277-282	$8.5	12
16	CS260.12	Christopher Creek Area Freight Improvements	260-277	$6.1	11
17	CS87.4	Sunflower Area Freight Improvements	213-219	$42.0	10
18	CS87.8	Ox Bow Estates Area Freight Improvements	243-247	$25.4	2
19	CS260.14	Mogollon Rim Area Climbing Lane	277-280	$19.1	1

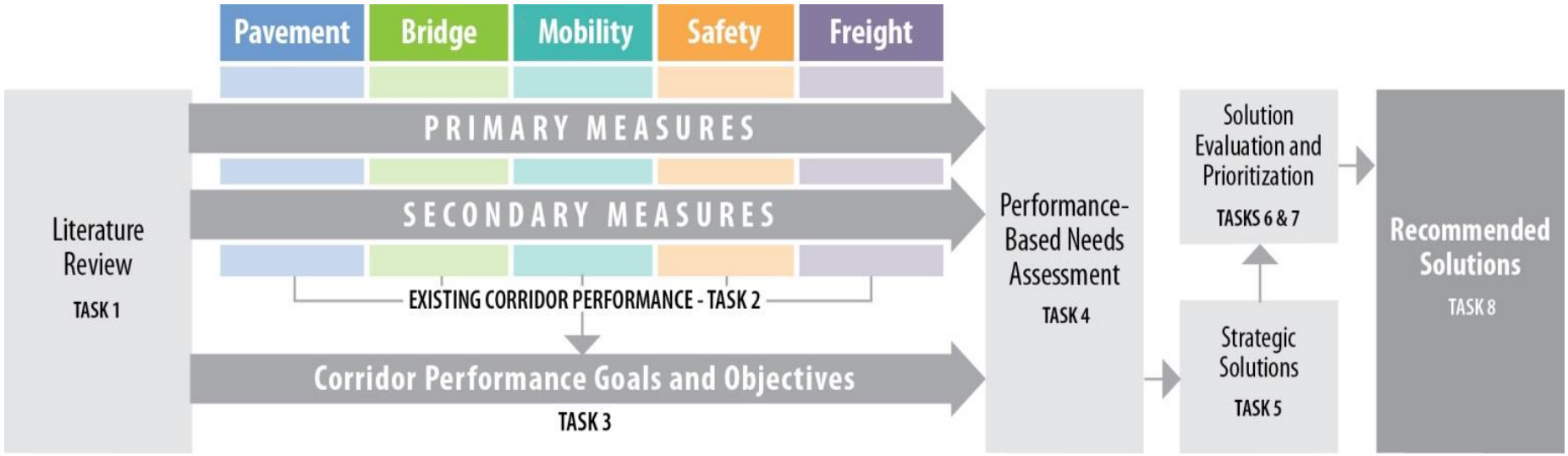
SR 87/SR 260/SR 377 Prioritized Recommended Solutions



SR 87/SR 260/SR 377 Corridor Profile Study: Loop 202 to I-40
Prioritized Recommended Solutions

Questions?

Next Steps



- **Round 3**: Submit Draft Final Report for TAC Review
- **Round 2**: Draft Final Report on ADOT Website
- **Round 1:** Draft Final Report on ADOT Website

CORRIDOR PROFLIE STUDIES

ROUND 3 HANDOUTS

TECHNICAL ADVISORY COMMITTEE MEETING

DECEMBER 1, 2016

Table 6: Prioritized Recommended Solutions

Rank	Candidate Solution #	Segment	Candidate Solution Name	Milepost Location	Estimated Cost ($ million)	Performance Effectiveness Score	Risk Factor	Segment Need	Prioritization Score	Investment Category [P] Preservation [M] Modernization [E] Expansion	Solution Need Reduction Notes				
											Pavement	Bridge	Safety	Mobility	Freight
1	85.12A	85-9	Buckeye Safety Improvements	154-149	3.6	87.9	1.59	0.85	119	M	0%	0%	39%	23%	27%
2	10W.5	10-4	Vicksburg Safety Improvements	32-50	9.0	50.6	1.70	1.23	106	M	0%	0%	80%	4%	12%
3	10W.9	10-7, 10-8	Tonopah to Palo Verde Safety Improvements	82-112	15	49.7	1.71	1.12	95	M	0%	0%	60%	5%	11%
4	85.13	85-13	N Gila Bend general purpose Lanes	120-123	22.4	40.4	1.36	1.30	71	E	0%	0%	0%	91%	5%
5	85.14B	85-14	Butterfield Trail CTL	120-123	7.2	20.3	1.36	1.80	50	M	0%	0%	0%	93%	0%
6	10W.8	10-5, 10-6, 10-7, 10-8	Vicksburg to Palo Verde Lighting Improvements	54-103	2.5	21.4	1.137	1.06	39	M	0%	0%	8%	0.6%	1%
7	85.14A	85-14	Butterfield Trail Widening	120-123	11.8	15.3	1.36	1.80	37	E	0%	0%	0%	83%	8%
8	10W.11	10-8	I-10/SR 85 Junction Ramp Improvements	112-113	4.4	8.8	1.67	1.08	16	M	0%	0%	38%	22%	2%
9	10W.7	10-5	Centennial Safety Improvements	54-71	36.5	8.3	1.71	0.92	13	M	0%	0%	67%	7%	5%
10	10W.10	10-8	355th Ave UP Vertical Clearance	101.4	3.6	6.6	1.32	1.08	10	M	10%	0%	0%	0%	38%
11	10W.4	10-3	US 60 Interchange Ramp Improvements	31	15.6	3.7	1.75	0.85	5	M	0%	0%	49%	7%	2%
12	10W.3	10-3	US 60 Interchange Safety Improvements	27-31	4.4	5.7	1.69	0.85	8	M	0%	0%	47%	3%	1%
13	10W.1	10-1	Ehrenberg Pavement WB	9-16	28.3	1.7	1.32	1.38	3	P	86%	0%	14%	5%	10%
14	10W.6	10-4	Bouse Wash Rest Area Ramp Improvements	52.5	4.4	1.6	1.47	1.23	3	M	0%	0%	2%	7%	0.5%
NR	*85.12B*	*85-9*	*Buckeye Grade Separations*	*154-149*	*81.8*	*10.4*	*Removed from further consideration based on low PES value compared to CS85.12A*								

Table 6: Prioritized Recommended Solutions

Rank	Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost (in millions)	Performance Effectiveness Score	Weighted Risk Factor	Segment Need	Prioritization Score	Investment Category [P] Preservation [M] Modernization [E]Expansion	Percentage by which Solution Reduces Performance Area Needs				
											Pavement	Bridge	Mobility	Safety	Freight
1	CS10E.21c	10E-7 and 10E-8	Tucson Mobility, Safety, and Freight Improvements	248–258	10.4	94.9	1.37	1.76	228.7	M	0%	0%	22%	6%	3%
2	CS10E.22	10E-8	Tucson Pedestrian Safety Improvements	257–258	2.6	56.6	1.44	1.92	156.8	M	0%	0%	3%	25%	13%
3	CS10E.23	10E-9	East Tucson Pedestrian Safety Improvements	262–264	2.4	63.7	1.44	1.69	155.2	M	0%	0%	2%	19%	11%
4	CS10E.28b	10E-10	Vail Mobility and Safety Improvements	274–286	16.3	63.7	1.73	1.39	153.0	M	0%	0%	7%	50%	15%
5	CS10E.18	10E-6	Marana Safety Improvements	237–242	3.3	79.8	1.74	1.08	149.4	M	0%	0%	2%	36%	18%
6	CS10E.10	10E-3	Casa Grande Safety Improvements	184–190	3.7	52.1	1.76	1.08	98.7	M	0%	0%	2%	25%	1%
7	CS10E.24c	10E-9	East Tucson Mobility, Safety, and Freight Improvements	262–274	17.0	38.7	1.42	1.69	92.7	M	0%	15%	31%	45%	28%
8	CS10E.8	10E-2	Casa Grande EB Shoulder Widening	183–184	0.6	27.4	1.77	1.69	82.0	M	0%	0%	0%	19%	0%
9	CS10E.20	10E-6	Marana Pedestrian Improvements	237–242	2.0	42.5	1.73	1.08	79.3	M	0%	0%	1%	14%	8%
10	CS10E.17a	10E-5	Pinal Air Park TI UP (#771) Bridge Vertical Clearance Mitigation	232.02	2.8	49.0	1.50	0.77	56.3	M	0%	100%	0%	2%	48%
11	CS10E.7a	10E-2	Seed Farm Road UP (#1216) Bridge Vertical Clearance Mitigation	179.37	2.9	18.9	1.44	1.69	46.1	M	0%	27%	0%	1%	58%
12	CS10E.19	10E-6	Marana Lighting Improvements	237–242	6.7	20.8	1.74	1.08	38.8	M	0%	0%	1%	23%	12%
13	CS10E.5a	10E-2	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.3	15.3	1.43	1.69	37.0	M	0%	24%	0%	0%	58%
14	CS10E.4a	10E-2	Nelson Road UP (#1213) Bridge Vertical Clearance Mitigation	174.63	3.0	14.9	1.42	1.69	35.7	M	0%	21%	0%	0%	58%
15	CS10E.3a	10E-2	Goodyear Road UP (#1149) Bridge Vertical Clearance Mitigation	169.85	3.0	14.8	1.42	1.69	35.6	M	0%	19%	0%	1%	58%
16	CS10E.6a	10E-2	Gas Line Road UP (#1215) Bridge Vertical Clearance Mitigation	177.76	4.4	14.2	1.44	1.69	34.5	M	0%	30%	0%	0%	58%
17	CS10E.38	10E-15	Exit 355 Lighting Improvements	355	0.2	15.5	1.73	1.23	33.1	M	0%	0%	1%	6%	2%
18	CS10E.37	10E-15	Page Ranch Road Safety Improvements	354–358	3.3	13.6	1.74	1.23	29.0	M	100%	0%	5%	52%	10%

Table 6: Prioritized Recommended Solutions (continued)

Rank	Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost (in millions)	Performance Effectiveness Score	Weighted Risk Factor	Segment Need	Prioritization Score	Investment Category [P] Preservation [M] Modernization [E]Expansion	Percentage by which Solution Reduces Performance Area Needs				
											Pavement	Bridge	Mobility	Safety	Freight
19	CS10E.1	10E-1 and 10E-2	Wild Horse Pass to SR 587 Lighting Improvements	163–176	8.7	9.8	1.71	1.70	28.4	M	0%	0%	0%	7%	0%
20	CS10E.29	10E-10	Vail Lighting Improvements	275–279	0.6	9.4	1.77	1.46	24.2	M	0%	0%	0%	1%	0%
21	CS10E.11a	10E-3	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.20	3.2	13.7	1.43	1.08	21.0	M	0%	54%	0%	0%	60%
22	CS10E.12a	10E-3	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	2.5	13.4	1.41	1.08	20.3	M	0%	42%	0%	0%	60%
23	CS10E.9	10E-2 and 10E-3	Casa Grande Lighting Improvements	183–190	4.7	9.9	1.76	1.16	20.3	M	0%	0%	0%	5%	0%
24	CS10E.13a	10E-4	Battaglia Road UP (#943) Bridge Vertical Clearance Mitigation	205.45	4.2	10.6	1.43	1.23	18.8	M	0%	37%	0%	0%	43%
25	CS10E.2	10E-2	Riggs Road to Casa Grande General Purpose Lane	167–184	202.8	8.0	1.38	1.69	18.8	E	87%	82%	71%	29%	1%
26	CS10E.33	10E-13	Dragoon Safety Improvements	317–318	1.2	11.8	1.58	0.92	17.3	M	0%	0%	10%	7%	4%
27	CS10E.27	10E-9	East Tucson Lighting Improvements	263–274	14.8	7.1	1.44	1.69	17.3	M	0%	0%	1%	11%	6%
28	CS10E.14a	10E-4	Alsdorf Road UP (#944) Bridge Vertical Clearance Mitigation	207.17	4.2	9.2	1.42	1.23	16.2	M	0%	27%	0%	0%	43%
29	CS10E.31	10E-12	Mescal Shoulder Widening	293–299	7.6	3.9	1.70	1.54	13.1	M	0%	0%	4%	16%	1%
30	CS10E.35	10E-13	Exit 318 Lighting Improvements	318	0.3	6.5	1.52	0.92	9.2	M	0%	0%	3%	1%	4%
31	CS10E.30	10E-12	Mescal EB Climbing Lane	293–296	13.5	5.0	1.49	1.54	8.9	E	25%	0%	9%	5%	0%
32	CS10E.36a	10E-14	Airport Road UP (#1114) Bridge Vertical Clearance	339.46	3.4	7.1	1.46	0.85	8.7	M	0%	65%	0%	0%	39%
33	CS10E.32	10E-12	Mescal WB Climbing Lane	296–299	13.5	1.8	1.38	1.54	3.9	E	51%	0%	9%	2%	0%
34	CS10E.39a	10E-16	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.5	4.3	1.40	0.62	3.7	M	0%	64%	0%	0%	37%
35	CS10E.40a	10E-16	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.3	4.3	1.39	0.62	3.7	M	0%	49%	0%	0%	37%
36	CS10E.34	10E-13	Dragoon EB Climbing Lane	317-318	6.4	1.1	1.61	0.92	1.6	E	0%	0%	6%	5%	4%

Prioritized Recommended Solutions

Rank	Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost ($ million)	Performance Effectiveness Score	Weighted Risk Factor	Segment Need	Prioritization Score	Investment Category	Solution Need Reduction Notes				
											Pavement	Bridge	Mobility	Safety	Freight
1	60.11	60-14	Waterfall Canyon Bridge (#328)	229.5	$1.7	168.4	1.501	2.00	506	Modernization	1%	100%	0%	0%	0%
2	60.8	70|60-13	US 60 Globe-Miami Safety Improvements	244.5-251	$10.2	114.3	1.728	2.23	440	Modernization	0%	0%	47%	48%	0%
3	60.13	60-14	US 60 Top-of-the-World Safety Improvements	232-234	$1.0	125.4	1.734	2.00	435	Modernization	0%	0%	0%	12%	0%
4	60.12B	60-14	US 60 Superior to Miami Climbing/Passing Lanes	227-243	$113.6	123.8	1.413	2.00	350	Expansion	20%	0%	91%	24%	11%
5	60.12A	60-14	US 60 Superior to Miami Widen Shoulder	227-243	$11.3	100.9	1.500	2.00	303	Modernization	0%	0%	6%	53%	5%
6	60.12C	60-14	US 60 Superior to Miami Four-Lane Divided	227-243	$157.2	93.0	1.418	2.00	264	Expansion	50%	0%	92%	31%	13%
7	60.14	60-14	US 60 Queen Creek Safety Improvements	227-229	$2.7	47.2	1.735	2.00	164	Modernization	0%	0%	0%	2%	0%
8	60.10	60-14	Queen Creek Bridge (#406)	227.71	$8.8	42.2	1.503	2.00	127	Modernization	1%	100%	0%	0%	0%
9	60.6	70|60-13	Pinal Creek Bridge (#36)	249.8	$2.4	36.7	1.505	2.23	123	Modernization	1%	100%	0%	0%	0%
10	60.7	70|60-13	Pinal Creek Bridge (#226)	249.64	$3.1	35.2	1.491	2.23	117	Modernization	1%	100%	0%	0%	0%
11	191.2	191-5	US191 Safford Safety Improvements	117-121	$1.4	32.2	1.779	2.00	114	Modernization	0%	0%	0%	32%	0%
12	60.9	70|60-13	US 60 Pinal SPRR UP (No. 0562) Freight Mitigation	253.4-253.8	$1.1	14.6	1.360	2.23	44	Modernization	1%	0%	0%	0%	26%
13	70.4	70-10	US 70 San Carlos Safety Improvements	268-292	$46.1	14.4	1.659	1.40	34	Modernization	0%	0%	33%	32%	0%
14	70.5	70-12	US 70 Cutter Safety Improvements	257-260	$5.6	13.1	1.596	1.31	27	Modernization	0%	0%	65%	36%	0%
15	191.1B	191-2	US 191 Elfrida to I-10 Freight Mitigation: Construct passing lanes, realign roadway, replace Cochise RR bridge	59.9-64	$121.5	1.0	1.408	1.38	2	Modernization	9%	0%	9%	0%	3%
16	191.1A	191-2	US 191 Elfrida to I-10 Freight Mitigation: Widen shoulders, realign roadway, replace Cochise RR bridge	59.9-64	$105.6	0.9	1.421	1.38	2	Modernization	9%	0%	55%	0%	3%

Table 6: Prioritized Recommended Solutions

Rank	Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost (in millions)	Investment Category (Preservation [P], Modernization [M], Expansion [E])	Performance Effectiveness Score	Weighted Risk Factor	Segment Need	Prioritization Score	Percentage by which Solution Reduces Performance Area Needs		
											Safety	Mobility	Freight
1	CS60W.3	60W-2	South Wickenburg Area Safety Improvements	115	0.88	M	110.86	1.58	1.85	326	47%	8%	3%
2	CS93.4-B	93-4	Wickenburg Ranch Area Safety Improvements	198.5	5.16	M	85.24	1.59	1.15	157	13%	63%	3%
3	CS60W.1	60W-1	Surprise Area Safety Improvements	138	6.25	M	73.49	1.77	1.08	141	47%	1%	10%
4	CS93.5-B	93-5 & 93-6	Joshua Tree Safety and Freight Improvements	183	24.75	M	56.80	1.57	1.28	114	72%	51%	19%
5	CS93.11	93-12, 93-13, & 93-14	Windy Point Safety Improvements	58	46.53	M	28.30	1.70	0.78	37	73%	27%	6%
6	CS60W.2	60W-2	Wittmann Area Safety Improvements	132	0.26	M	32.73	1.77	0.62	36	5%	0%	0%
7	CS93.4-A	93-4	Wickenburg Ranch Area Safety Improvements	198.5	63.93	E	11.98	1.60	1.15	22	18%	60%	24%
8	CS93.5-A	93-5 & 93-6	Joshua Tree Safety and Freight Improvements	183	163.07	E	27.17	1.51	1.28	16	42%	50%	17%
9	CS93.9	93-11	Kingman Area Safety and Freight Improvements	71	45.00	M	3.93	1.70	1.54	10	17%	18%	0%
10	CS93.7-B	93-9B	Cane Springs Safety Improvements	109	10.18	M	2.32	1.77	1.08	4	13%	0%	2%
11	CS93.6-B	93-7	Burro Creek Safety and Freight Improvements	147	7.42	E	1.96	1.36	1.46	4	20%	21%	6%
12	CS93.6-A	93-7	Burro Creek Safety and Freight Improvements	147	2.98	M	1.08	1.37	1.46	2	20%	7%	2%
13	CS93.7-A	93-9	Cane Springs Safety Improvements	109	46.63	E	0.63	1.76	1.08	1	12%	0%	2%

SR 87/SR 260/SR 377: Prioritized Recommended Solutions

Rank	Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Investment Category [P] Preservation [M] Modernization [E]Expansion	Estimated Cost (in millions)	Performance Effectiveness Score	Weighted Risk Factor	Segment Average Need Score	Prioritization Score	Percentage by which Solution Reduces Performance Area Needs				
											Pavement	Bridge	Mobility	Safety	Freight
1	CS87.6	87-5	Rye Area Safety and Freight Improvements	235-241	M	$0.2	115.8	1.50	1.38	241	0%	0%	20%	31%	2%
2	CS87.1	87-1	Salt River Area Safety Improvements	177-182	M	$4.2	100.6	1.77	1.31	233	0%	0%	3%	49%	19%
3	CS87.9	87-6	Mazatzal Area Safety Improvements	246-251	M	$2.3	82.6	1.68	1.62	225	0%	0%	10%	28%	2%
4	CS87.3	87-4	Sunflower Area Safety Improvements	213-235	M	$18.3	70.4	1.52	1.77	189	0%	0%	21%	47%	12%
5	CS260.10A	87-7 and 260-8	Payson Area Safety and Freight Improvements	251-253	M	$0.4	150.2	1.75	0.71	187	0%	0%	1%	18%	1%
6	CS87.2	87-3	Bush Highway Area Safety and Freight Improvements	191-213	M	$6.8	69.1	1.49	1.77	182	0%	0%	26%	56%	8%
7	CS260.11	260-9	Lion Springs Area Mobility and Freight Improvements	256-260	E	$50.0	67.1	1.41	1.80	170	0%	0%	90%	41%	11%
8	CS87.7	87-6	Ox Bow Estates Area Safety Improvements	241-250	M	$2.4	53.3	1.54	1.62	133	0%	0%	8%	5%	2%
9	CS260.15	260-12	Forest Lakes Area Safety and Freight Improvements	282-304	M	$56.5	52.1	1.54	1.62	130	0%	0%	51%	84%	43%
10	CS77.16C	77-16	Holbrook Area Mobility and Freight Improvements (adjacent to SR 77)	386-389	E	$46.4	31.6	1.69	2.10	112	100%	100%	48%	100%	95%
11	CS77.16A	77-16	Holbrook Area Mobility and Freight Improvements (SR 377/SR 77 connection)	386-389	E	$92.1	14.1	1.50	2.10	40	0%	0%	56%	10%	95%
12	CS87.5B	87-4	Slate Creek Pavement Improvements (Replace)	224-226	M	$7.2	8.8	1.51	1.77	23	0%	0%	11%	14%	4%
13	CS260.10B	87-7 and 260-8	Payson Area Safety and Freight Improvements	251-253	M	$13.8	19.6	1.65	0.71	23	0%	0%	8%	24%	14%
14	CS77.16B	77-16	Holbrook Area Mobility and Freight Improvements (US 180/SR 77 connection)	386-389	E	$75.8	6.4	1.50	2.10	20	0%	0%	57%	10%	95%
15	CS260.13	260-11	Mogollon Rim Area Freight Improvements	277-282	M	$8.5	7.3	1.40	1.20	12	0%	0%	10%	18%	3%
16	CS260.12	260-10	Christopher Creek Area Freight Improvements	260-277	M	$6.1	6.4	1.48	1.15	11	0%	0%	7%	11%	2%
17	CS87.4	87-4	Sunflower Area Freight Improvements	213-219	M	$42.0	3.8	1.53	1.77	10	0%	0%	5%	11%	3%
18	CS87.8	87-6	Ox Bow Estates Area Freight Improvements	243-247	M	$25.4	1.0	1.39	1.62	2	0%	0%	4%	0%	1%
19	CS260.14	260-11	Mogollon Rim Area Climbing Lane	277-280	M	$19.1	0.4	1.36	1.20	1	0%	0%	4%	0%	1%